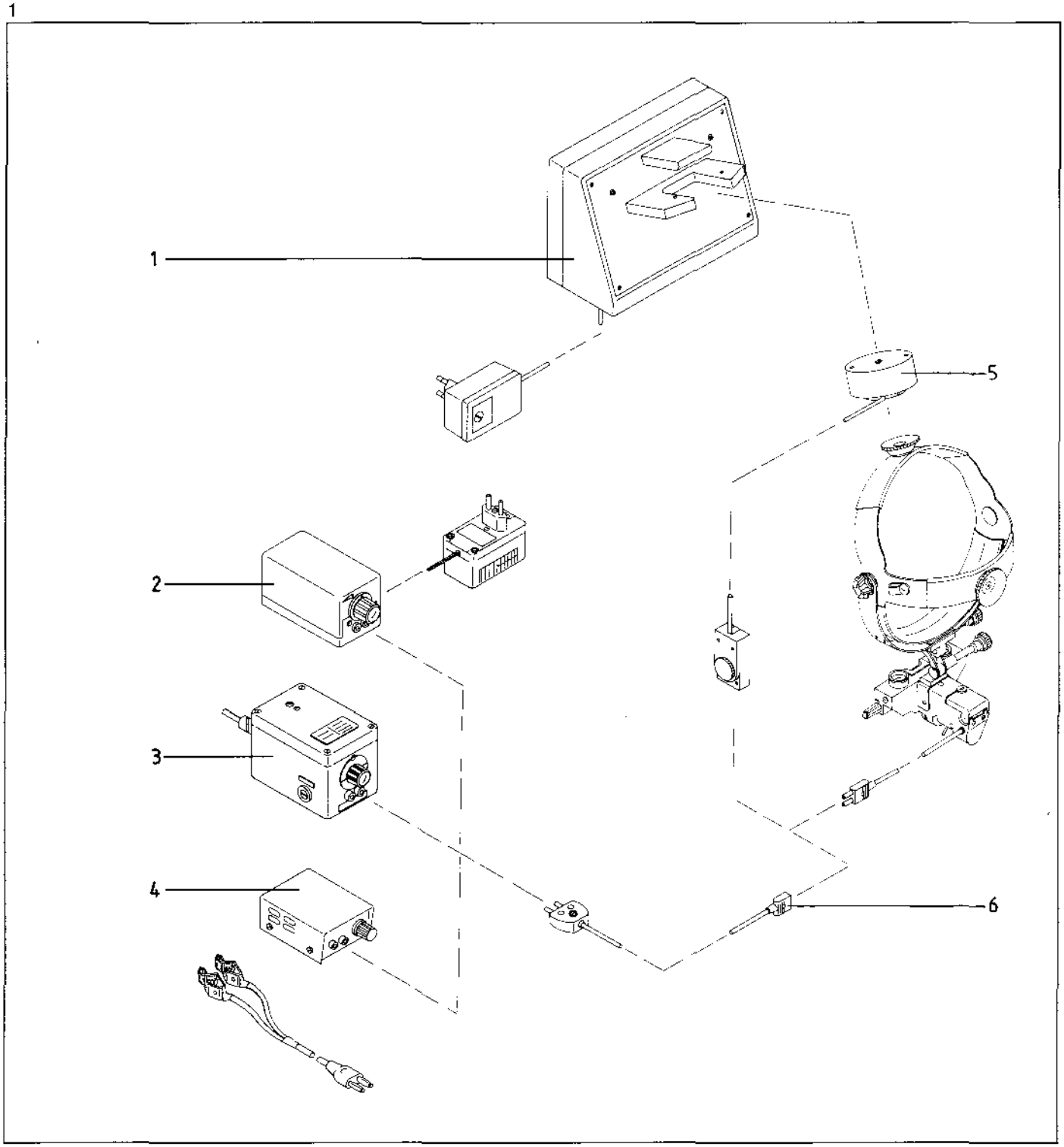
1



General information

The indirect ophthalmoscope is used for stereoscopic examination of the retina. A knob on either side is used to adapt the observer's interpupillary distance to the size of the patient's pupil. Connected to this adjustment is the adjustment of the illumination system. This considerably facilitates fundus examinations even through narrow pupils and in peripheral areas. The headband can be exactly adapted to the user's head.
This instruction manual describes the use of the indirect ophthalmoscope with rechargeable battery (5) and charger (1). Depending on the intensity of illumination the battery lasts 25–40 minutes. When longer examination times are necessary, or when recharging after each examination is impossible, the following supply units are available for the *6 V 10 W halogen illumination system:*

- external battery (2) with 2.5× the capacity of battery (5).
- power supply unit (3).
- 12 V car battery adapter (4).

These units are connected to the indirect ophthalmoscope with the aid of connecting cable (6).
The indirect ophthalmoscope basic equipment is suitable for an interpupillary distance between 55 mm and 70 mm. The instrument can be adjusted to greater interpupillary distances by the user. How this is done is described on page 11.

Optical principle

The light is directed into the patient's eye through the aspheric lens in such a way that the bulb filament is imaged in the pupil. The size of the illuminated fundus area depends on the focal length and the diameter of the aspheric lens. The light reflected from the fundus is gathered by the lens in the intermediate image plane to form a real inverted image and is viewed by the observer. The pupils of the observer are imaged by the lens in the patient's pupil. The observer's interpupillary distance is reduced by mirrors. The stereo base is the distance between the images of the observer's pupils. Accommodation is assisted by plus lenses built into the ophthalmoscope. Any ametropia the patient may have is compensated by image displacement.

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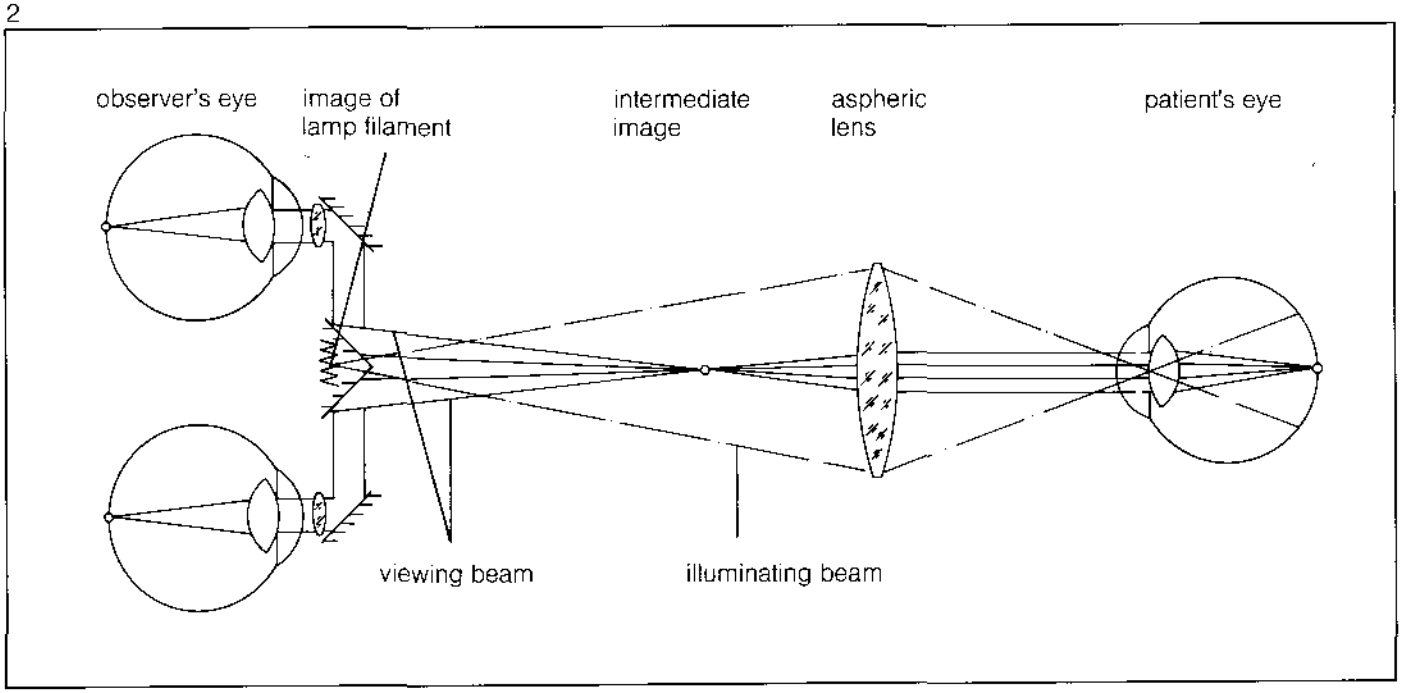
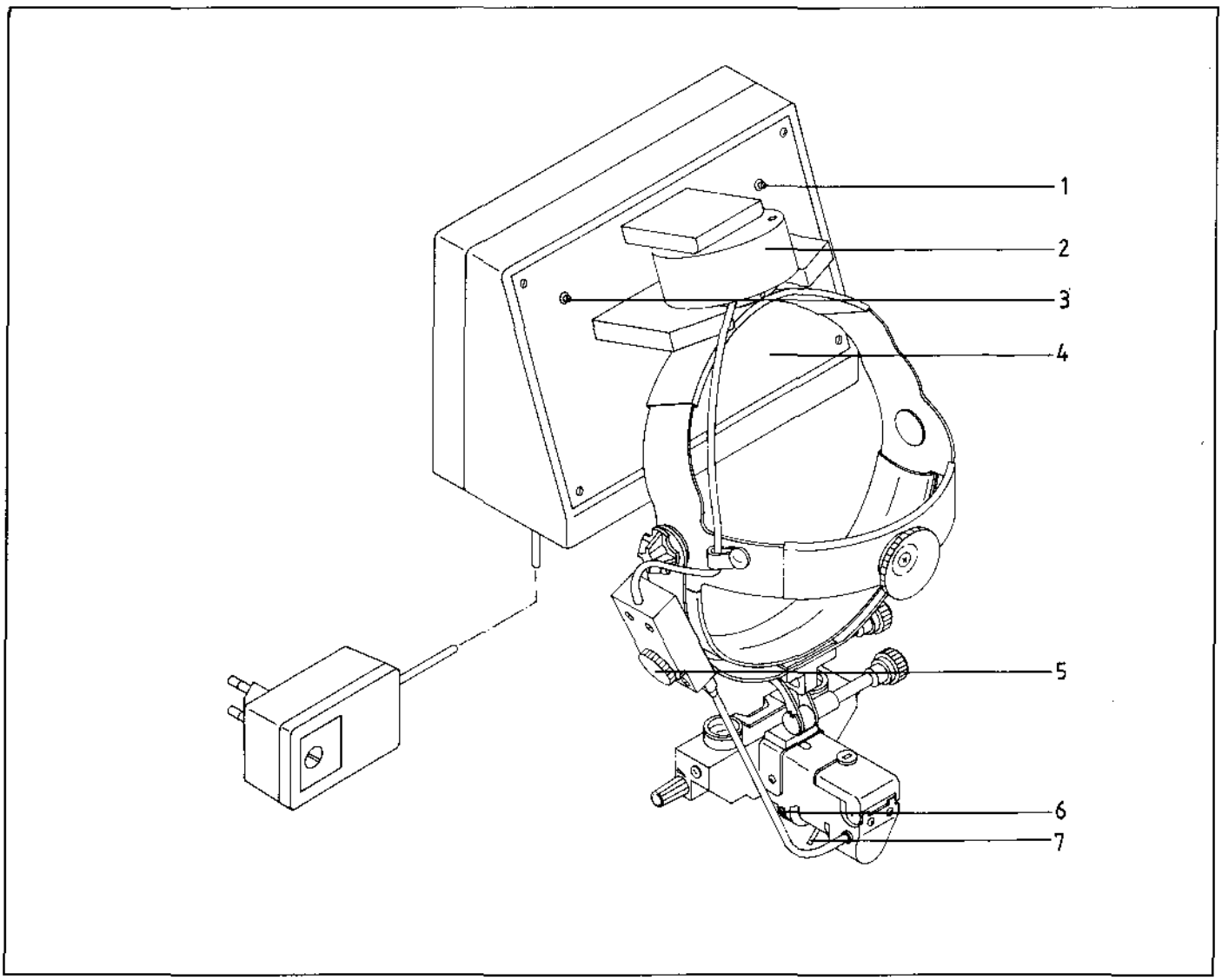


Indirect ophthalmoscope with battery and wall bracket charger

The capacity of the battery is sufficient for an examination time of 25 to 40 minutes depending on the intensity of illumination. For recharging, the battery is inserted into the charger (4). The halogen bulb need not be switched off for recharging, as the charger has a switch-off device. When the battery is slid into the charger, the bulb circuit is interrupted and the charging process is started.
This includes rapid charging for 4 hours with 150 mA (red diode (1) on) which results in the battery being charged to 80% of its capacity. After this, the charging current is automatically switched to 75 mA (green diode (3) on). This current lies above the rate required to compensate for losses (current needed to conserve the charge is 35 mA); this current therefore allows recharging of the battery without damaging it by overcharging. One night is sufficient to bring a flat battery to 100% of its capacity.
Stored batteries should be subjected to 3 rapid charging cycles (red diode) before use. The life of the battery cells is given by the manufacturer as more than 1000 cycles if the battery is always fully discharged and fully recharged.
Knob (5) is used to adjust the intensity of illumination and to switch the halogen bulb on and off. In case of illumination failure, check whether the bulb is defective or whether the fuse must be changed. Bulb and fuse change is described on page 11. By turning knurled ring (6) a green or blue filter can be brought into the beam path. When the ring is in the normal position a heat-absorbing filter is positioned in the beam path. The size of the illuminated fundus area can be varied with lever (7).

3



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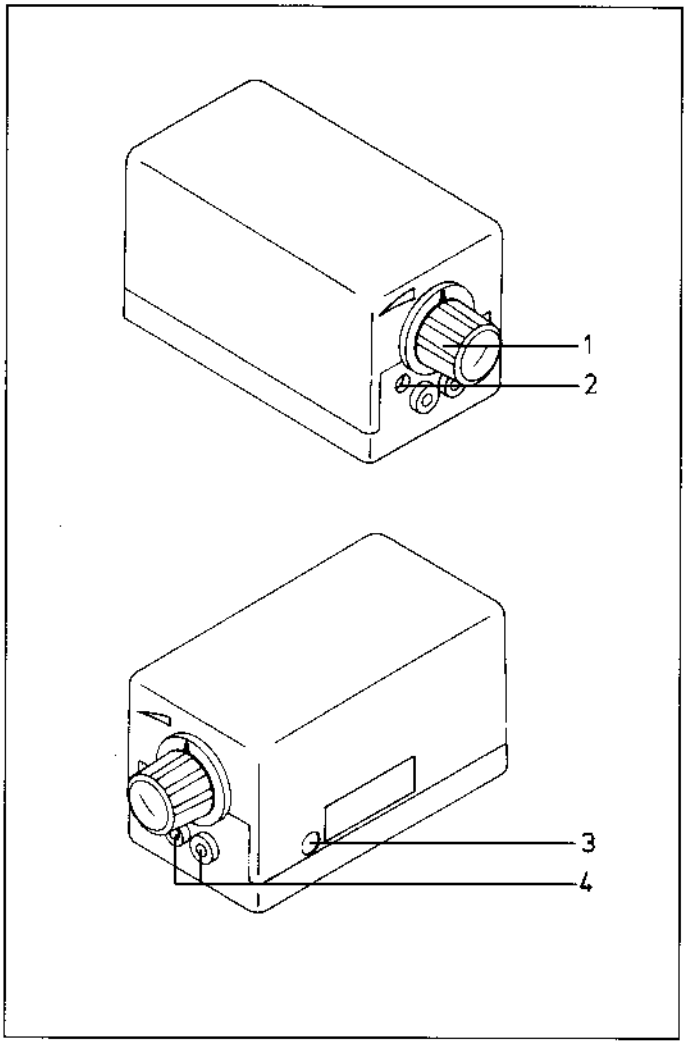


External battery

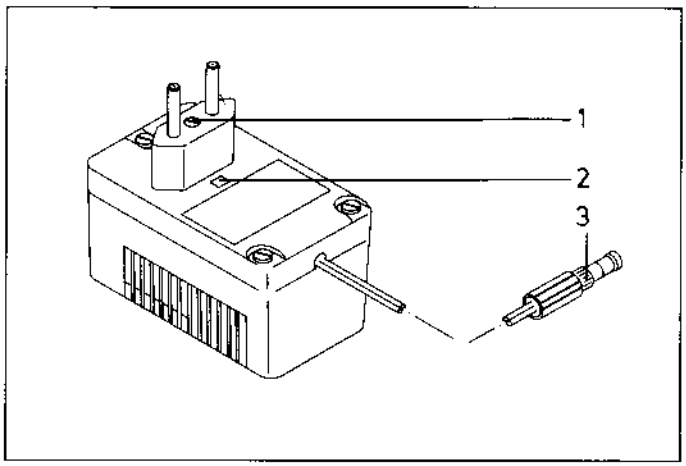
This battery enables the indirect ophthalmoscope to be used without line connection. Only the connecting cable to the ophthalmoscope, order No. 309625-9910, is required. Before use, the battery must be charged for 14–18 hours with the charger shown in Fig. 5 or any other charger supplying a current of 180 mA.
The battery has an extremely long life unless it is used over excessive periods of time without recharging. Recharging is recommended as soon as reduced performance is noticed. Failure to switch the battery off on occasion will not cause any damage. Full capacity of the battery will be obtained by extending the regular charging time of 14 hours by 4–6 hours. The battery is gas-tight and can be stored for years without any effect on life or capacity at any charging stage. After an extended period of non-use, the battery should first be charged for 24 hours, its full capacity being reached again after two or three recharging/discharging cycles.

1 On/off switch. Brightness is controlled with this knob.
2 Operation indicator
3 Outlet for connection of the charger
4 Outlets for connection of the cable to the ophthalmoscope

Specifications

Length/width/height: 140mm/65mm/70mm
Weight: 0.8 kg
Output: 6 V max. 10 W 1.8 Ah
Cat. No. 309615

5



Charger

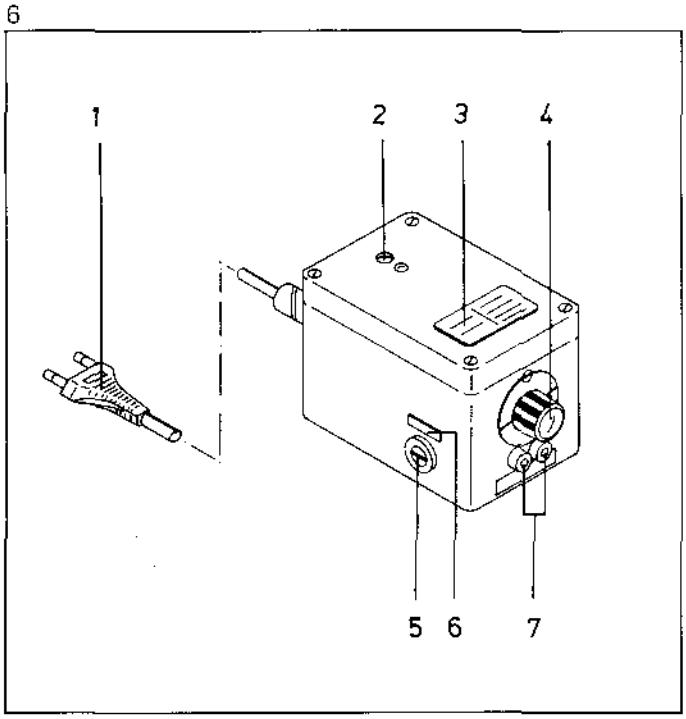
This is required for recharging the external battery shown in Fig. 4.

1 Screw for adjusting to the line voltage 110/220 V AC
2 Window showing voltage set
3 Connector for connection to external battery

Specifications

Length/width/height: 90mm/50mm/85mm
Weight: 0.5 kg
Cat. No. 309616

6



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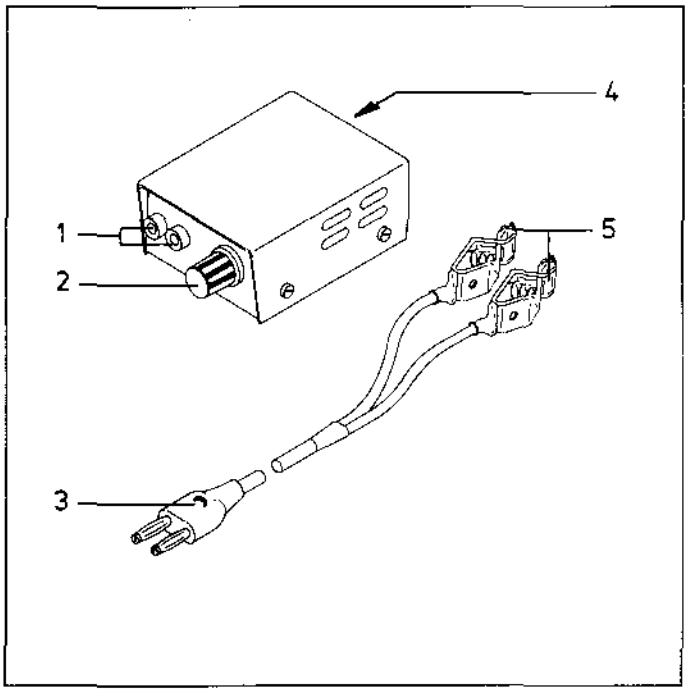


Power supply unit

This power supply unit enables the indirect ophthalmoscope to be connected to the line. The connecting cable, order No. 309625-9910, is required for connection of the power supply unit to the ophthalmoscope.

1 Power plug for line connection
2 Window showing voltage set
3 Rating plate
4 On/off switch. Brightness is controlled with this knob.
5 Fuse cap. When the cap is unscrewed, the fuse is accessible. The fuse data can be taken from plate (6).
6 Plate showing fuse data
7 Outlets for connection of the cable to the ophthalmoscope

Specifications

Length/width/height: 140 mm/80 mm/86 mm
Weight: 1.25 kg
International voltage series:
100–110–120–127–220–240 V AC
Line frequency: 50...60 Hz (cps)
Power consumption: 25 VA
Line fuse 2 amp, slow-blow, Cat. No. 380127-0240
Power supply unit: Cat No. 309610-9901 (European version)
309620 (US version)

12 V car battery adapter

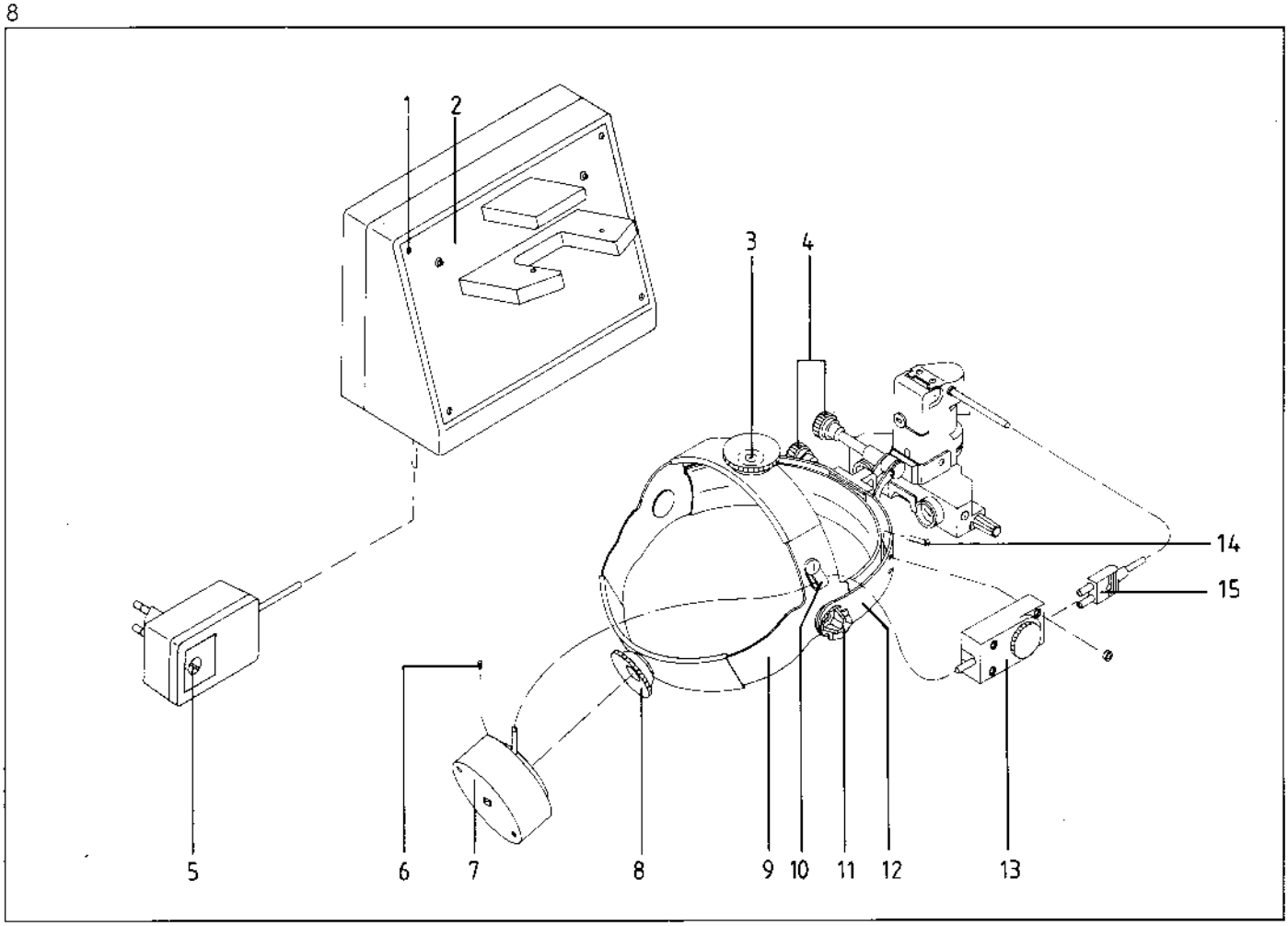
This battery adapter is used to operate the indirect ophthalmoscope with a 12 V car battery. The connecting cable, order No. 309625-9910, is required for connection of the battery adapter to the ophthalmoscope.

1 Outlets for connection of the cable to the ophthalmoscope
2 On/off switch which can also be used for brightness control
3 Plug to be connected to outlets (4)
4 Outlets for connection of plug (3)
5 Clamps marked plus and minus to be connected to the corresponding battery poles

Specifications

Length/width/height: 100 mm/80 mm/40 mm
Weight: 0.150 kg
Cat. No. 309619

8



Preparations

Before use of the instrument, the following must be performed:

- Adapt headband (9) to your head by adjusting knobs (3) and (8).

- Push battery (7) onto knob (8) and secure with 3 screws (6).

Note: as shown in Fig. 8, the cable of the battery must point upwards to ensure that it does not obstruct insertion of the ophthalmoscope into the charger.

- Attach brightness control (13) to headband using screws (14) and nuts. Feed cable through loop (10).

- Connect plug (15) to brightness control (13).

- Unscrew four screws (1) in battery charger and remove front panel (2). Pierce through the bottom plate of the plastic housing in the spots marked and mount charger in the desired area (cable pointing downwards). Refasten front panel (2).

- Check line voltage set on transformer at voltage selector screw (5) and readjust, if necessary.

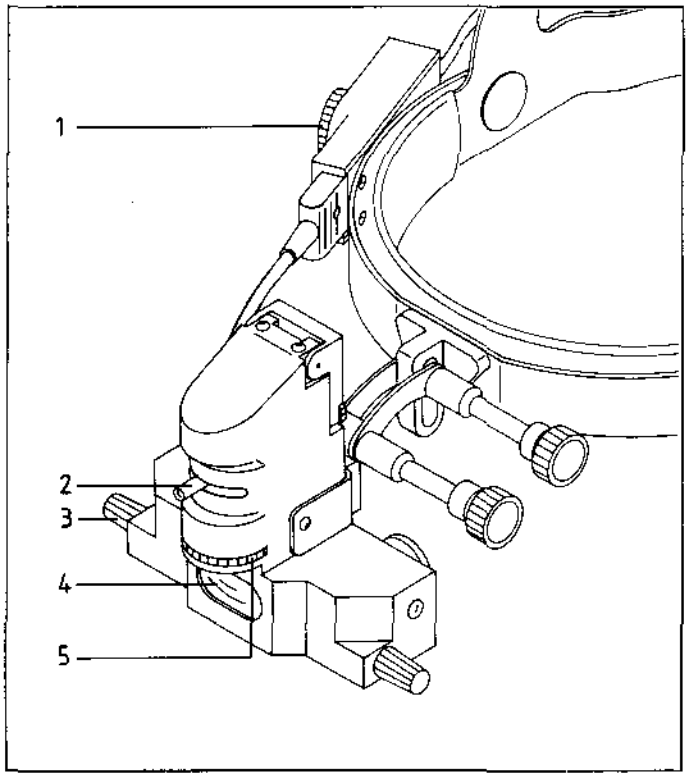
- Use screws (11) to set the ease of motion of instrument support (12).

- After loosening of the four screws (4), the ophthalmoscope can be positioned as required.

Fundus examination

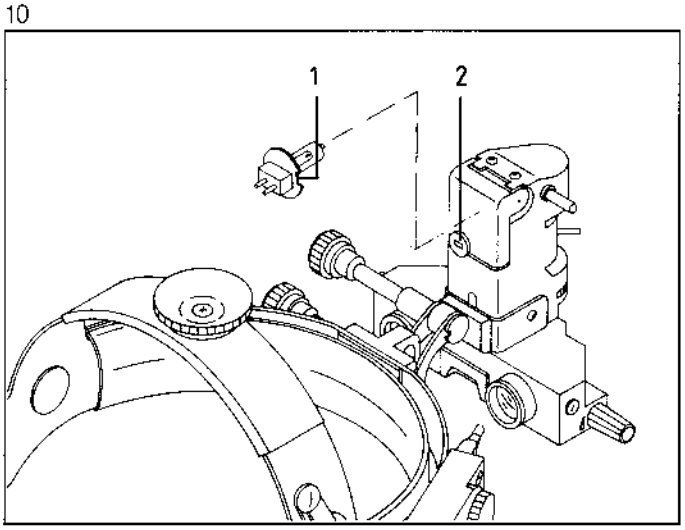
For fundus examination proceed as follows:
- Switch on the illumination with knob (1).The intensity of illumination is continuously variable by turning this knob.
- Hold the aspheric lens in front of the patient's eye. The distance between the observer's eye and the lens should be about 400 mm.

9



- The size of the illuminated fundus area can be varied by turning lever (2).
Small illuminated fundus areas are of advantage especially in the case of narrow pupils and for examination of peripheral areas.
- When the iris diaphragm is fully open, the lens must be illuminated completely.
- Use knob (3) to adapt your interpupillary distance to the size of the patient's pupil.
The observer's pupils and the bulb filament are then imaged in the patient's pupil by the aspheric lens. To achieve this, the ophthalmoscope mirrors (4) are moved horizontally as required. The design of the instrument is such that adjustment of the mirrors automatically brings about a displacement and tilt of the illumination system reflecting mirror. This is especially of advantage in fundus examinations of narrow pupils and/or in peripheral areas. Thus stereoscopic examinations of the fundus are possible even with undilated pupils (with a 20 D lens a minimum pupil dia. of about 2 mm is required). In this case it is advisable to illuminate only a small fundus area because of the effect of reflections.
- With the pupil undilated, turn the right knurled knob (3) clockwise – the left one counterclockwise – to the stop. Then set the stereo base possible according to the size of the patient's pupil by reversing the direction of adjustment. The same applies for examination of peripheral areas.
- With the pupil dilated (wider than 4 mm), turn the right knurled knob (3) counterclockwise – the left one clockwise – until shortly before the stop.
- Use the knurled ring (5) to bring a green or blue filter into the beam path. In the normal position a heat-absorbing filter is positioned in the beam path.

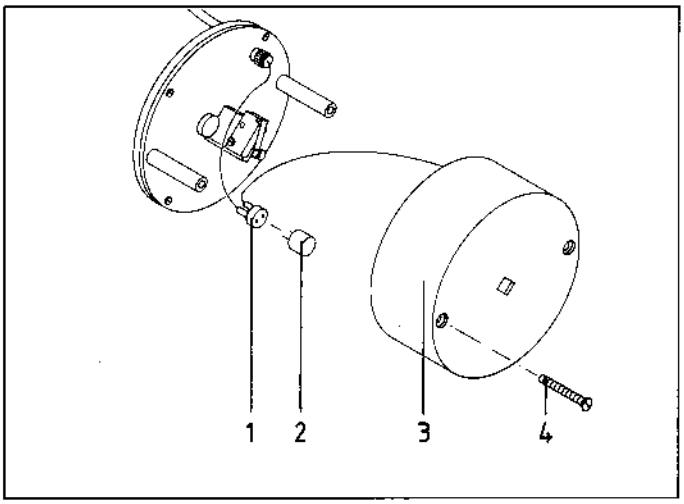
10



Changing the bulb

- Switch off the instrument and wait until the bulb has cooled down.
- Loosen screw (2), turn up the cover and remove the bulb.
- Insert a new bulb. Make sure that the two pins in the housing engage in the recess (1) of the bulb socket and that the bulb is firmly positioned. Be careful not to touch the glass bulb.

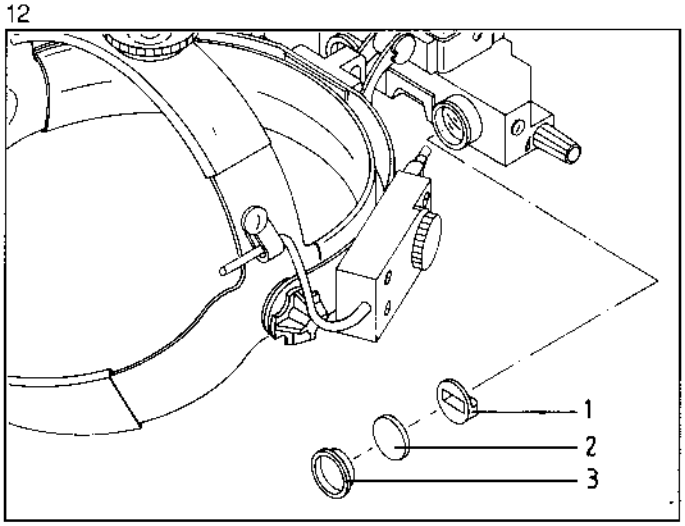
11



Changing the fuse in the battery

- Unscrew screws (4) and remove cover (3).
- Remove defective fuse (2) from holder (1) and insert a new fuse.
- Replace cover (3) and fasten with screws (4). Be careful that no cables are caught when closing. Check whether charging switch functions properly.

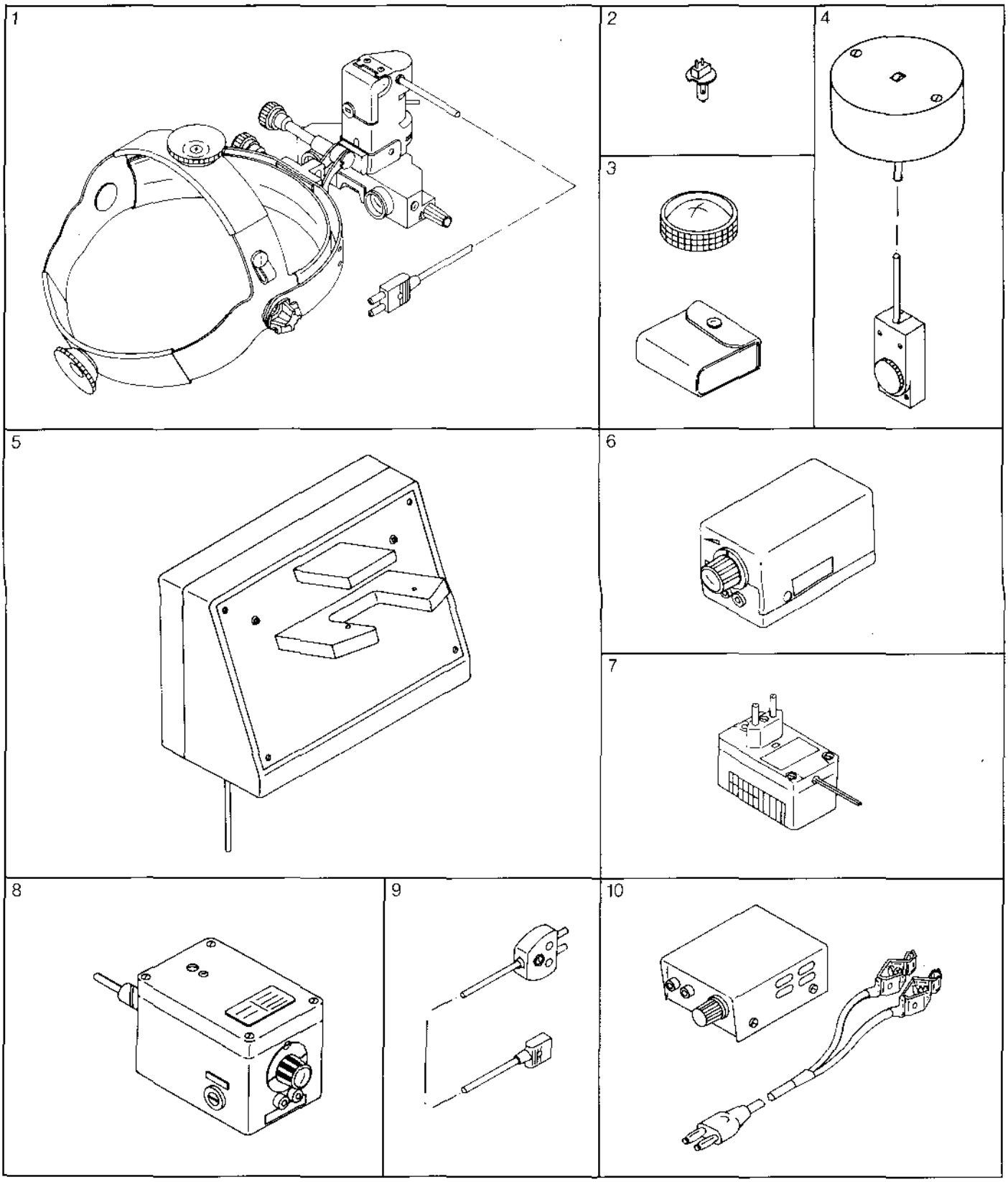
12



Adjustment for greater PD

- Remove retaining ring (3) by turning it counterclockwise and remove lens (2).
- Take stop (1) out of the mount, turn by 180° and reinsert.
- Insert lens with concave side facing observer and screw in retaining ring.
- Modify other side in the same way.

13



Indirect ophthalmoscope with battery and charger

comprising:

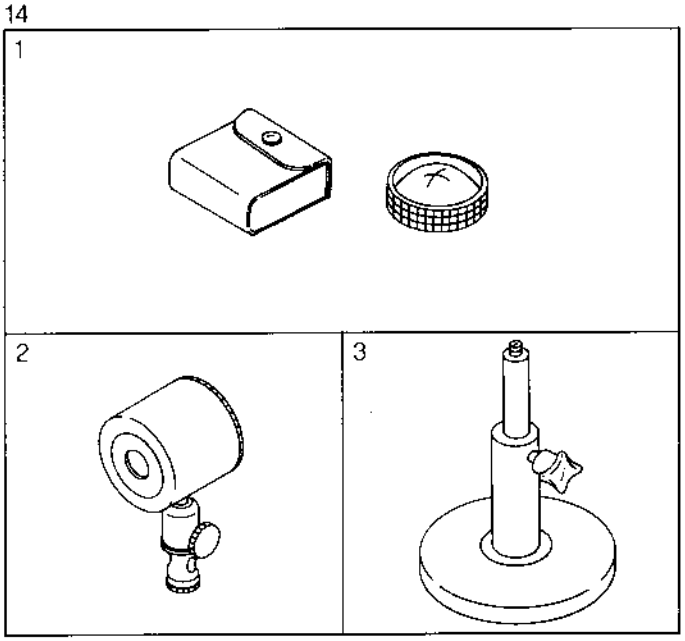
	Cat. No.
1 Indirect ophthalmoscope with headband	301080-9901
Indirect ophthalmoscope without headband (USA)	301080-9910
2 6 V 10 W halogen bulb	380120-7030
3 Aspheric lens 20 D, glass	301059
4 Battery	309621
5 Charger with plug-in transformer	309622
Charger without plug-in transformer (US version)	309623
Case (not shown)	309038

Indirect ophthalmoscope with external battery

comprising:

1 Indirect ophthalmoscope with headband	301080-9901
Indirect ophthalmoscope without headband (USA)	301080-9910
2 6 V 10 W halogen bulb	380120-7030
3 Aspheric lens 20 D, glass	301059
6 External battery	309615
7 Charger	309616
9 Connecting cable	309625
Case (not shown)	309038

14



Indirect ophthalmoscope with power supply unit

comprising:

	Cat. No.
1 Indirect ophthalmoscope with headband	301080-9901
Indirect ophthalmoscope without headband (USA)	301080-9910
2 6 V 10 W halogen bulb	380120-7030
3 Aspheric lens 20 D, glass	301059
8 Power supply unit	309610-9901
Power supply unit (US version)	309620
9 Connecting cable	309625-9910
Case (not shown)	309038

Indirect ophthalmoscope with 12 V car battery adapter

comprising:

1 Indirect ophthalmoscope with headband	301080-9901
Indirect ophthalmoscope without headband (USA)	301080-9910
2 6 V 10 W halogen bulb	380120-7030
3 Aspheric lens 20 D, glass	301059
9 Connecting cable	309625-9910
10 12 V car battery adapter	309619
Case (not shown)	309038

Accessories Fig. (14)

1 Aspheric lens 16 D, glass, with case	301058
Aspheric lens 25 D, glass, with case	301060

For training purposes (Fig. 14)

2 Model eye	304606
3 Table stand	304603

Replacement parts

6 V 10 W halogen bulb	380120-7030